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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/587,147  | 07/24/2006  | Ryosuke Nishida      | 2006_1143A          | 4981             |
| 513 7590 03/31/2009<br>WENDEROTH, LIND & PONACK, L.L.P.<br>1030 15th Street, N.W.,<br>Suite 400 East<br>Washington, DC 20005-1503 |             |                      |                     |                  |
| EXAMINER  |             |                      |                     |                  |
| CORDRAY, DENNIS R   |             |                      |                     |                  |
| ART UNIT  |             | PAPER NUMBER         |                     |                  |
| 1791  |             |                      |                     |                  |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/587,147

**Applicant(s)**

NISHIDA ET AL.

**Examiner**

DENNIS CORDRAY

**Art Unit**

1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☒ Claim(s) 1-4, 10 and 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/ICE)  
Paper No(s)/Mail Date 7/24/2006
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_

**DETAILED ACTION**

***Claim Objections***

1. Claims 1-4, 10 and 11 are objected to because of the following informalities:

In Claim 1, line 2, the word "a" should be inserted between "having" and "cross-";

In Claim 2, line 2, the word "an" should be inserted between "of" and "aqueous";

In Claim 2, line 5, the word "the" should be inserted between "where" and "concentration " and the words "cation" and "ions" should be plural;

In Claim 3, line 4, the word "the" should be inserted between "which" and "concentration "and the words "cation" and "ions" should be plural;

In Claim 4, line 5, the word "cross-link" should be changed to "cross-links" or "cross-linking";

In Claim 10, line 2, the word "an" should be inserted between "of" and "aqueous";

In Claim 10, line 8, the word "the" should be inserted between "where" and "concentration " and the words "cation" and "ions" should be plural;

In Claim 11, line 6, the word "the" should be inserted between "where" and "concentration " and the words "cation" and "ions" should be plural.

Applicant is advised to carefully review the claims for other grammatical errors.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 3, 6, 10 and 11 recite "pulp-shaped fiber." The intended meaning of pulp-shaped fiber is not clear. Does the pulp-shaped fiber have the general morphology of a pulp fiber, which can have a length significantly longer than a cross sectional dimension and can have a circular or flattened cross section? Does pulp-shaped indicate fibers having a length and diameter similar to that of pulp fibers? Is some other meaning intended?

Claim 2 recites preparation of aqueous slurry but fails to recite how the aqueous slurry relates to the paper. Is the aqueous slurry the papermaking furnish that is used in the manufacture of paper? Is the aqueous slurry part of a pulping process? Is the aqueous slurry a coating composition? A recycle stream? Some other aqueous slurry?

Claim 2 provides for the use of water having a specified cationic concentration, but does not set forth any steps involved in the use of the water, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim 3 recites that "aqueous liquid ... is impregnated with paper comprising the inorganic fiber and the pulp-shaped fiber." The intent of the claim is not clear. Is recycled paper added to the aqueous liquid? Is the aqueous liquid added to the paper? Is some other process intended?

Claim 5 recites "cross-linking structure by divinylbenzene and carboxyl group." Are divinylbenzene and species having carboxyl groups two crosslinking agents used to crosslink the particles? Is the divinylbenzene bonded with carboxyl groups on the particle to form the cross-links? Is another cross-linking structure intended?

Claim 7 recites the limitation "the thermally adhesive fiber" in Claim 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 10 recites preparation of aqueous slurry and the manufacture of paper by a wet method, wherein the aqueous slurry contains organic particles, inorganic fiber and pulp-shaped fiber. The claim also recites that water having a specified cation concentration is used, but fails to recite whether the water having a specified cation concentration is used to make the aqueous slurry.

Claim 11 recites that "aqueous liquid ... is impregnated with paper comprising the inorganic fiber and the pulp-shaped fiber." The intent of the claim is not clear. Is recycled paper added to the aqueous liquid? Is the aqueous liquid added to the paper? Is some other process intended?

The remaining claims depend from and inherit the indefiniteness of Claim 1.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belding et al (5791153) in view of Nishida (6429265) as evidenced by Lorah et al (US 2002/0055581).

Claims 1 and 4-9: Belding et al discloses heat energy and moisture exchange or adsorbent media used in an air-conditioning and ventilating system. The media comprises layers of absorbent paper having a desiccant incorporated within during fabrication of the paper and/or coated on the formed paper. The desiccant can be any material capable of adsorbing moisture from an air stream and desorbing the moisture in a counter flowing air stream (Abs; col 2, lines 47-58; col 4, lines 64-67; col 5, lines 26-35 and 61-67; col 6, lines 1-9). In some embodiments, the absorbent paper is formed by a standard papermaking process comprising wet-laying the desiccant, inorganic fibers and fibrillated organic fibers (fibrillated acrylic fibers are preferred organic fibers) (col 7, lines 23-31, 39-45 and 53-55; col 8, lines 6-9 and 52-55). Preparation of an aqueous slurry of the desiccant, inorganic fibers and fibrillated organic fibers is an inherent part of the wet-laying process. Thermally adhesive fibers are not required.

Belding et al does not disclose the claimed organic particles.

Nishida '265 discloses particles of crosslinked acrylonitrile polymer capable of absorbing and releasing a high amount of moisture (removing moisture from air is discussed in the background section), the particles comprising potassium salt type carboxyl groups in an amount of 1.0-8.0 mmol/g. In some embodiments, the crosslinking of acrylonitrile groups is introduced by hydrazine and the acid salt groups are formed by hydrolysis of remaining nitrile groups by alkali metal salts. The metals used can include Li, Na, K, Mg and Ca, although K is essential and gives the best result when all carboxyl groups are changed to potassium type (Abs; col 1, lines 5-14; col 2, lines 15-45; col 3, lines 23-32 and 65-67; col 4, lines 1, 2 and 26-45; col 6, lines 14-18, 29-53 and 65-67; col 7, lines 1-3). In other embodiments, the polymer is copolymerized with a crosslinking monomer such as divinylbenzene that reacts with a carboxyl group (col 5, line 53 to col 6, line 7).

Nishida '265 discloses making a paper by adding the polymer particles to a dispersion of pulp and synthetic fiber and manufacturing paper using a conventional paper machine. Alternatively, a slurry of polymer particles are applied to a paper (col 8, lines 9-31).

The art of Belding et al, Nishida '265 and the instant invention is analogous as pertaining to moisture absorbing and desorbing compositions and paper comprising the compositions. It would have been obvious to one of ordinary skill in the art to use the claimed crosslinked acrylate particles as the desiccant in the adsorbent media of Belding et al in view of Nishida '265 as a functionally equivalent material having been disclosed for the purpose. It would also have been obvious to obtain the claimed

moisture absorbing rate, swelling rate, thermal shrinking rate in the paper as the structure of the paper so made is substantially the same as the claimed paper.

Claims 2, 3, 10 and 11: Nishida '265 discloses that potassium is the best performing of the carboxylic acid salts and the best result is obtained when all carboxyl groups are changed to potassium salts. Polymers containing acid groups are well known to exchange cations readily (see Lorah et al, p 8, right column, lines 3-6). It would have been obvious to one of ordinary skill in the art to use distilled water or deionized water having the claimed cation concentration other than potassium ions to prepare and disperse or emulsify the organic crosslinked particles in order to prevent exchange of non-potassium ions with the potassium ions of the carboxylic salts in the particles and lower the efficiency thereof for the intended absorption and desorption.

Claims 1, 4 and 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belding et al (5791153) in view of Tanaka et al (5691421).

The disclosure of Belding et al is used as above. Belding et al does not disclose the claimed organic particles.

Tanaka et al discloses particles of crosslinked acrylonitrile polymer capable of absorbing and releasing a large amount of moisture (removing moisture from air is discussed in the background section), the particles comprising salt type carboxyl groups in an amount of 1 mmol/g (Abs; col 1, lines 1-15 and 41-60). In some embodiments, the crosslinking of acrylonitrile groups is introduced by hydrazine and the acid salt groups



are formed by hydrolysis of remaining nitrile groups by alkali metal salts. The metals used include Li, Na, K, Mg and Ca (col 1, line 65 to col 2, line 65).

Tanaka et al discloses a moisture absorption of 17 to 48% at 20 °C/65% RH (col 4, lines 10-20, Example 1, Table 1; col 6, lines 44 and 45). The particles can be added to any material and are used in any field where moisture absorption and desorption are required (col 7, line 20 to col 8, line 4).

The art of Belding et al, Tanaka et al and the instant invention is analogous as pertaining to moisture absorbing and desorbing compositions and substrates comprising the compositions. It would have been obvious to one of ordinary skill in the art to use the claimed crosslinked acrylate particles as the desiccant in the adsorbent paper of Belding et al in view of Tanaka et al as a functionally equivalent material having been disclosed for the purpose. It would also have been obvious to obtain the claimed absorbing rate, swelling rate and thermal shrinking rate in the paper as the structure of the paper so made is substantially the same as the claimed paper.

Claims 1 and 4-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belding et al (5791153) in view of Nishida (6080797 or 6387970).

The disclosure of Belding et al is used as above. Belding et al does not disclose the claimed organic particles.

Nishida '797 discloses particles of crosslinked acrylonitrile polymer capable of absorbing and releasing a large amount of moisture (removing moisture from air is discussed in the background section), the particles comprising salt type carboxyl groups

in an amount of 2.0-12.0 mmol/g. In some embodiments, the crosslinking of acrylonitrile groups is introduced by hydrazine and the acid salt groups are formed by hydrolysis of remaining nitrile groups by alkali metal salts. The metals used include Li, Na, K, Mg and Ca (Abs; col 1, lines 1-14; col 2, lines 19-67; col 3, lines 1 and 31-36; col 3, line 64 to col 4, line 21). In other embodiments, the polymer is copolymerized with a crosslinking monomer such as divinylbenzene that reacts with a carboxyl group (col 5, lines 26-46).

Nishida discloses making a paper by adding the polymer particles to a dispersion of pulp and synthetic fiber and manufacturing paper using a conventional paper machine. Alternatively, a slurry of polymer particles are applied to a paper (col 10, lines 37-56).

Nishida '970 is a division of Nishida '797, has the same disclosure.

The art of Belding et al, Nishida ('797 or '970) and the instant invention is analogous as pertaining to moisture absorbing and desorbing compositions and paper comprising the compositions. It would have been obvious to one of ordinary skill in the art to use the claimed crosslinked acrylate particles as the desiccant in the adsorbent media of Belding et al in view of Nishida ('797 or '970) as a functionally equivalent material having been disclosed for the purpose. It would also have been obvious to obtain the claimed moisture absorbing rate, swelling rate, thermal shrinking rate in the paper as the structure of the paper so made is substantially the same as the claimed paper.

Claims 2, 3, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belding et al in view of Tanaka et al or Nishida ('797 or '970) and further in view of Nishida ('265) and as evidenced by Lorah et al.

The disclosures of over Belding et al, Tanaka et al and Nishida ('797 or '970) are used as above. Belding et al, Tanaka et al and Nishida ('797 or '970) do not disclose using water having the claimed cationic ion concentration.

Nishida '265 discloses that potassium is the best performing of the carboxylic acid salts and the best result is obtained when all carboxyl groups are changed to potassium salts.

Polymers containing acid groups are well known to exchange cations readily (see Lorah et al, p 8, right column, lines 3-6).

The art of Belding et al, Nishida ('797, '970 and '265) and the instant invention is analogous as pertaining to moisture absorbing and desorbing compositions and paper comprising the compositions. It would have been obvious to one of ordinary skill in the art to use distilled water or deionized water having the claimed cation concentration other than potassium ions to prepare and disperse or emulsify the organic crosslinked particles in the paper of Belding et al in view of Tanaka et al or Nishida ('797 or '970) and further in view of Nishida ('265) in order to prevent exchange of non-potassium ions with the potassium ions of the carboxylic salts in the particles and lower the efficiency thereof for the intended absorption and desorption.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hiroaka et al (4312907) discloses a water impermeable sheet comprising non-woven fabric and water absorbing/desorbing particles. Kaibe et al (6046119) and Takamiya et al (6143390) disclose other water absorbing/desorbing particles.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DENNIS CORDRAY whose telephone number is (571)272-8244. The examiner can normally be reached on M - F, 7:30 -4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Dennis Cordray/  
Examiner, Art Unit 1791

/Eric Hug/  
Primary Examiner, Art Unit 1791